

WHAT IS CLAIMED IS:

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1. A liquid crystal device comprising a nematic liquid crystal, voltage means for applying a voltage across said liquid crystal, and two substrates each provided with an alignment layer, wherein:

said liquid crystal is sandwiched between said two substrates;

said nematic liquid crystal can be placed in at least one operating state and at least one non-operating state, and

at least one of said alignment layers is provided with a plurality of surface protrusions formed from an anisotropic material.

2. A liquid crystal device as claimed in claim 1, wherein said protrusions have a height which is at least 10% of the thickness of the liquid crystal.

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3. A liquid crystal device as claimed in claim 2, wherein said protrusions have a height which is at least 20% of the thickness of the liquid crystal.

4. A liquid crystal device as claimed in claim 3, wherein

said protrusions have a height which is substantially 50% of the thickness of the liquid crystal.

5. A liquid crystal device as claimed in claim 1, wherein at least some of said protrusions nucleate said liquid crystal into said operating state from said non-operating state when said voltage exceeds a threshold value.

6. A liquid crystal device as claimed in claim 1, wherein at least some of said protrusions isolate said operating state from said non-operating state or from another operating state.

7. A liquid crystal device as claimed in claim 1, wherein said liquid crystal is divided into a plurality of pixels each having an active region, and wherein the active region of each said pixel contains, or overlaps with, or lies adjacent or close to, at least one of said protrusions, so that nucleation occurs within said active region.

8. A liquid crystal device as claimed in claim 1, wherein said liquid crystal is divided into a plurality of pixels, and wherein each said pixel is surrounded by at least one of said protrusions, so that the pixel is isolated.

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9. A liquid crystal device as claimed in claim 1, wherein said nematic liquid crystal is a pi-cell.

10. A liquid crystal device as claimed in claim 1, wherein said nematic liquid crystal is a negative pi-cell or splay bend device (SBD).

11. A liquid crystal device as claimed in claim 1, wherein said nematic liquid crystal is a bistable twisted nematic (BTN).

12. A liquid crystal device as claimed in claim 1, wherein at least some of said protrusions are twisted anisotropic protrusions.

13. A liquid crystal device as claimed in claim 1, wherein at least some of said protrusions are tilted anisotropic protrusions.

14. A liquid crystal device as claimed in claim 1, wherein at least some of said protrusions are tilted and twisted anisotropic protrusions.

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15. A liquid crystal device as claimed claim 1, wherein said anisotropic protrusions are formed from a polymerisable reactive mesogen.

16. A liquid crystal device as claimed in claim 1, wherein said operating and non-operating states are topologically distinct from each other.

17. A liquid crystal device as claimed in claim 1, wherein when said voltage is substantially zero different regions of said liquid crystal exist in first and second non-operating states, and the first non-operating state is stabilised by said anisotropic protrusions.

18. A liquid crystal device as claimed in claim 17, wherein said first and second non-operating states are T and H states respectively.

19. A liquid crystal device as claimed in claim 17, wherein said first non-operating state is the same state as said operating state.

20. A method of producing a liquid crystal device as claimed in claim 1, said method comprising the steps of forming

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a reactive mesogen layer on one of said substrates, curing said layer by irradiating said layer through a mask to leave said one of said substrates coated with anisotropic protrusions, and forming a liquid crystal cell by sandwiching nematic liquid crystal material between said two substrates.

21. A method as claimed in claim 20, wherein said reactive mesogen layer is formed from RM257 doped with CB15.

22. A method as claimed in claim 20, wherein said reactive mesogen layer is formed from RM257 mixed with RM308.

23. A method as claimed in claim 20, wherein said reactive mesogen layer is formed from RM257 mixed with RM308 and doped with CB15.